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ABSTRACT

This report for an automated circulation control system to replace the currently used automated off-line batch system discusses the general requirements for the requested system, the equipment needed, the planned uses and design of the proposed system, its utilization, its expected benefits, its estimated costs, the alternatives considered, and the projected implementation schedule. The equipment required consists of a dedicated minicomputer system supporting visual display or cathode ray terminals (CRT) and other peripheral equipment. Appendices summarize costs for the alternative systems, detail one-time costs for modifications to the present system to place it online, and chart annual operating costs for the alternative systems. (FM)

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AN AUTOMATED LIBRARY CIRCULATION SYSTEM:

A JUSTIFICATION

PREPARED BY

CHARLES B. HARRELL

ARLINGTON, TEXAS: THE UNIVERSITY OF TEXAS AT ARLINGTON LIBRARY

DECEMBER, 1978

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I. PURPOSE

The purpose of this request is to acquire an automated circulation control system, utilizing a stand-alone, minicomputer system with appropriate peripheral equipment, to replace the present circulation system in the University Library at The University of Texas at Arlington. This system provides primary support to the mission of the Library, which is to support the instructional and research programs of U.T. Arlington.

II. GENERAL REQUIREMENTS

The requested circulation system must furnish current information on the status of all circulating Library items and of all Library patrons for all hours of Library operation, presently ninety-six hours a week. In addition, the system must control access to Library materials, to assure that the fullest utilization of the collections can be realized without abuse and misuse of the materials and without penalizing Library users. Finally, the system must furnish statistical reports on the use of the collections by the Library users, to support collection development, budget allocations, and other managerial decisions.

III. IDENTIFICATION

The equipment required to replace the present circulation system consists of a dedicated minicomputer system supporting visual display or cathode ray terminals (CRT) and other peripheral equipment. The hardware and software will be acquired as a result of one request for quotations, with enhancements to the software to be furnished by the successful bidder on a continuing basis.

System Equipment:

1 Central Processing Unit

1 Operator's Console

1 Software Package (Operating System, Assembler, Sub-Programs and Routines)

1 Magnetic Disk Storage Subsystem for Collection and User Files

1 Magnetic Tape Drive

1 Medium Speed Printer

1 Optical Character Recognition (Light Pen) Scanner Terminal (Primary Station)

2 Visual Display (CRT) Terminals with Light Pen Scanners (Secondary Stations)

1 Self-contained or portable Subsystem capable of performing checkout and checkin functions offline.

IV. PLANNED USES

A. Requirements

The primary purpose of a library circulation system is to provide organized control for the loan of items in the collection to library patrons, including students, faculty and staff of the University, and for other specified users. The planned system must provide current and continous control of the approximately 675,000 books, microforms, films, tapes, and other materials in the collection, and must support a half million transactions for approximately 200,000 loans a year. The circulation system must satisfy the following requirements:

1. Identify and approve borrowers for loans;
2. Checkout, check-in and record loans;
3. Maintain the current status information for Library collection items;

4. Locate items in circulation;

5. Allow borrowers to renew loans of materials;

6. Maintain a record of overdue materials and fines associated with these;

7. Produce recall and overdue notices;

8. Provide a means of circulating reserve materials for time spans as short as two hours;

9. Provide for the recall of items in circulation;

10. Provide for personal reserves for items in circulation and yet needed by other patrons;

11. Maintain and produce statistics for various management and collection development considerations.

Because the Library collections and services are integral in supporting the instructional and educational programs of The University, the circulation system must function during all hours of Library operation, and must be rapid, easily operated by a small staff, reliable, and adequate to support user needs during periods of high demand, such as the end of each semester.

The circulation system currently in use at the University Library is an automated off-line batch system which utilizes IBM unit record equipment in daily use since the fall semester of 1967. The in-house system includes two 357 card readers, one 358 sequencer, and two 026 key punches. Support equipment consists of two 029 key punches, one of which is reconfigured as a verifier. Each circulating Library title carries an eighty-column punched card with data for the unique identification of the item. Each eligible borrower is issued a campus identification card during registration,which includes a social security number punched into the card. When a borrower wishes to checkout an item, the

identification card and the book card are inserted into one of the 357 card readers, and the information from both sources is automatically punched into an eighty-column card. This card is manually assembled into a deck which includes all circulation transaction cards. Five times a week such a deck is taken to the University Computer Center, where a cumulated printout in call number order of all items in circulation is prepared. Once a week overdue notices are prepared, which are then manually checked and mailed by the Library Circulation staff. Rudimentary statistics are compiled once a month and cumulated annually by the Computer Center. All filing, overdue notice checking, overdue list preparation, file searching, and record retrieval must be done manually. Aside from monthly and yearly statistics on the gross number of circulated items, no managerial reports can be prepared. Even with the batch mode process, the system is labor-intenstive, and will require greater expenditures of time and funds as service demands increase if the quality of service is to be maintained. Presently, the Library must maintain control over more than 675,000 individual items in its collections with present circulation activity at approximately 500,000 transactions annually. The current system can satisfy portions of only four of the eleven requirements listed above.

B. System Design

The proposed circulation system will utilize light pen scanners and optical character recognition (OCR) code labels for data

identification and collection, for both Library items and Library patrons. In the case of Library items, each will have an OCR label placed on the inside of the front cover. Library patrons will have OCR labels attached to their campus identification cards. In both instances all required information about the item or patron will be associated with this OCR number. Online item inventory, patron, circulation, hold, fines, reserve, and statistics files will be maintained on magnetic disk, accessible during all hours of Library operation. Three circulation stations will be connected to the central processing unit. The primary station must be capable of handling large volumes of checkout and checkin transactions by means of a hand held light pen scanner which collects circulation data by reading optically-encoded patron and item labels. The primary station shall support checkout, checkin and renewal functions, shall provide for appropriate indicator lamps and/or brief displays to prompt correct operator procedures, and shall be equipped with audible and visible alarms which signal exceptional conditions. This station need not have a cathode ray tube (CRT) module, nor provide the capability to support any other functions.

The secondary stations shall have a CRT display, a light pen scanner, and an alpha-numeric keyboard with sufficient keys to control the station. Secondary stations must be capable of supporting all systems functions, excepting only those which require the use of an interactive dialog via an input/output typewriter.

In operation, a Library patron wishing to borrow an item will present the item and his or her campus identification card at one of the circulation stations. Circulation personnel will pass the light pen scanner in turn over an OCR label identifying the checkout function, over the OCR label on the campus identification card, and over the OCR label attached to the Library item. The information gathered in these actions will be recorded automatically in the circulation files. The date on which the item is due will be manually stamped on a slip attached to the item. When an item is returned, the light pen scanner will be passed over an OCR label identifying the checkin function and over the item OCR label. The system will automatically record the return and will retain pertinent statistical information concerning the loan. Any fine calculations will be performed, holds or personal reserve requests will be detected, and the need for an availability notice will be noted during the checkin function. Notices and reports will be generated on demand or at predetermined times. The system will provide other support functions, including the searching and reporting of the status of individual items, or patrons, the creation of statistical and managerial reports, and the generation of a variety of notices. A medium speed printer located near the central processing unit will be used in the production of reports and notices. A magnetic tape drive will be used to input patron information at regular intervals during the academic year.

The system described will entirely replace the present system, will enable the Library to monitor the use of its collections effectively and efficiently, and will provide vital information collection development and maintenance, which will contribute appreciably to patron satisfaction and will assure efficient use of Library materials and personnel.

C. Utilization

The central processing unit, the operator's console, the magnetic disk storage subsystem, the magnetic tape drive, and the printer will be located in a sequestered section of the Library circulation department. The self-contained circulation subsystem will be used on demand at all service points. The primary circulation station will be positioned at the reserve counter, one secondary station will be placed at the circulation counter, and one secondary station will be located in the materials processing department. The locations of all three stations will be a maximum of approximately thirty-five feet from the central processing unit. The system will be designed and utilized by the University Library staff, with occasional support from the Administrative Computer Services department of The University. The Associate University Librarian will coordinate the planning, design, installation and utilization of the automated system. The system will be operated during all Library service hours, presently ninety-six hours a week, with additional operation as required for the satisfactory maintenance and revision of the circulation files. The Library is open a portion of the day for a minimum of 335 days a year, and the circulation system will be utilized during this time. The system described

will have an expected life of ten years, although in actuality it should be operational for a longer period of time because the preponderance of functions performed are electronic rather than mechanical in nature.

IV. EXPECTED BENEFITS

The proposed automated online circulation system will allow the Library to fulfill the responsibility for full and accurate bibliographic control and service of the Library collections to the University community for the first time. Comparative costing of alternative systems, with savings expected over the life of the systems, is detailed in Appendices A, B, and C. Improvements in the effectiveness and efficiency of service, which cannot be assigned a direct dollar value, are listed below:

1. Cost savings over the present system beginning in the first year of operation;
2. Circulation and reserve transactions will be handled more efficiently;
3. The Library will be able to handle increasing amounts of work without additional staff;
4. Statistical and management reports produced by the system will enable Library personnel to identify accurately material usage and areas of needed collection development;
5. The need for manual files and records will be eliminated, reducing the chances for errors and mistakes;
6. The level of service to the academic community will improve dramatically, as a result of the availability of accurate, current

information about Library materials;

7. The Library staff will be able to operate the system, without the present dependence on data processing staff;
8. Improved accuracy will be effected:
9. It is expected that sixteen percent less student assistant help will be required;
10. Campus identification cards will be utilized, thus eliminating the need for special library cards;
11. Notices and reports will be available on demand, rather than being a relatively low priority in terms of University requirements on Administrative Computing Services;
12. The system provides for the possible abolition of fines, thus eliminating a cumbersome manual system requiring the coordination of four University administrative units.

VI. COSTS

A. Estimated One-Time Costs

Hardware & Software Package	$187,000
Transportation	1,000
Conversion of approximately 40,000 OCLC records	4,000
Conversion of Patron Records	500
Site Preparation	100
Supplies:	
20,000 OCR Labels	600
20,000 Date Due Slips	100
Total	$193,300

B. Continuing (Annual) Costs

Hardware & Software Maintenance (Level cost for first three years, with three percent inflation factor thereafter)	$ 16,500
Supplies & Postage, refer to Appendix C, page 21.	

No additonal personnel will be required for the proposed system, and it is anticipated that sixteen percent less student help will be necessary once the system is operational. The costs for supplies will be less than for the present system, since the OCR labels can be created on demand as a product of the system. Library item files are already in machine-readable form, so that these can be input after a reformating program is written. In addition, items added to the Library holdings over the last five years are available from OCLC archives tapes, so that the more current material can be reformated from this source and loaded into the system. New items added to the Library collections will be added to the circulation system as a step in material processing. Patron information for the system can be stripped from existing machine-readable records and loaded into the system. Matching the patron with a unique OCR code will be done at first use of the system by the patron. No additional expenses are anticipated in the operation of the proposed system, with the exception of those detailed in Appendix C.

VII. ALTERNATIVES CONSIDERED

A. The first widespread applications of automated procedures to library circulation activities were based on the use of punched cards as a means of data collection and retention, with a large

computer required to process and deliver the information desired in either an offline or online configuration. Rapid advances in technology have included the development of smaller computers capable of satisfactorily handling many data processing functions, especially when coupled with optically encoded labels utilizing either barcodes or optical character recognition (OCR) codes. With the present state of automation technology, minicomputer systems located in libraries compare favorably with systems utilizing larger computers located elsewhere and with manual circulation systems. For the U.T. Arlington Library, four alternatives were considered:

1. Retain the present punched card system, with the immediate replacement of some equipment. Unfortunately, the 357 card readers, or the equivalent, are not available any longer from IBM;
2. Enhance the present system and place it online to The University IBM 360/155 computer. This alternative would require the acquisition of IBM 3270 type terminals and approximately 2,400 hours of system and programming effort, and would only fulfill four of the requirements for a circulation system listed in IV.A.;
3. Share a circulation system already in existence through interagency sharing. A survey of existing systems is detailed in section B below;
4. Acquire a packaged system from one of several commercial businesses which now offer circulation systems to libraries.

The system is installed in a library, with all equipment, software, training and technical assistance provided by the vendor. The library and its parent institution are spared the research and development effort required in creating and maintaining a unique system.

B. A survey of libraries in state-supported institutions was conducted recently by Dr. John B. Corbin, Associate Library Director for Technical Services at Stephen F. Austin State University, in an effort to determine what resources currently exist for possible interagency sharing of circulation systems. With Dr. Corbin's permission, the results of the survey are presented below:

1. East Texas State University, Commerce. IBM 1031 Circulation System online to the University's computer center;
2. Midwestern University, Wichita Falls. Online circulation system;
3. Pan American University, Edinburg. Circulation system, written in COBOL, online to the University's DEC 10 computer;
4. Sam Houston State University, Huntsville. Offline circulation system using punched cards and Addressograph-Multililth equipment;
5. Southwest Texas State University, San Marcos. Circulation system online to the University's DEC 10 computer;
6. Tarlton State University Stephenville. Offline punched card system using IBM 357 and 026 equipment, data processed by Amdahl computer at Texas A & M University in College Station;
7. Texas A & I University, Kingsville. Circulation system online to the University computer center;

8. Texas A & M University, College Station. Circulation system online to University's Amdahl computer;
9. Texas Tech University, Lubbock. In process of trying to acquire an automated circulation system;
10. University of Houston, Houston. Commercial online circulation system (CLSI, Inc.) using an in-house minicomputer;
11. University of Texas at Austin, Austin. Mohawk Data Collection circulation system (punched card) using a University computer;
12. University of Texas at Dallas, Richardson. A specially designed circulation system using an in-house Hewlett-Packard minicomputer and a host computer in the University of Texas Regional Computer Center;
13. University of Texas at El Paso, El Paso. Commercial (Checkpoint-Plessey) circulation system;
14. University of Texas -- Permian Basin, Odessa. Commercial (Checkpoint-Plessey) circulation system;
15. University of Texas at San Antonio, San Antonio. Circulation system using IBM 3270 terminals online to the University's IBM 370/148 computer;
16. University of Texas Health Science Center, San Antonio. Prepackaged circulation system (CLSI, Inc.) located at Trinity University, with remote online terminals at UTHSC-SA.

In addition to the systems identified above, a significant number of public, junior college, and private academic libraries in Texas have automated circulation systems. Although these resources are present, a number of problems exist which preclude interagency

sharing of equipment and services:

1. The commercial prepackaged systems utilize software which is proprietary and unique, and practically speaking, can not be duplicated;
2. Each of the sixteen academic libraries noted above employ different identification codes, circulation policies and regulations, financial and statistical systems, et cetera. The acquisition or sharing of a circulation system designed for a unique application by another library is possible only after extensive system development and programming;
3. The possibility of joining or sharing another system is tempered by the continued expense of telecommunication charges, the necessity of acquiring compatible equipment, the required development and/or duplication of software capable of matching the other system, developing a program of staff training, and acquiring satisfactory maintenance service. After extensive consideration and research, and after comparing the cost figures in Appendices A, B, and C, it is apparent that the most economically and organizationally feasible alternative available to the Library at The University of Texas at Arlington is to acquire a prepackaged circulation system composed of both equipment and software from a commercial vendor through an open competative bid process.

VIII. FUTURE SCHEDULE

The Request for Quotations (RFQ) requires that the successful bidder shall have the proposed system installed and operational within thirty days after the contract is awarded. The desired implementation schedule is outlined below. No extensive site preparation will be necessary,

since a suitable location was provided during a previous Library renovation. All personnel necessary for optium use of the proposed system are currently on the Library staff; no additional employees will be needed, and it anticipated that some reduction in student assistance hours can be effected. The training of the Library personnel will be supplied by the successful bidder, as a part of the contractual requirements. Conversion procedures and techniques will be done primarily by the Library staff, with some minor assistance from University Administrative Data Processing in the form of programming, and with a one-time conversion of approximately forty thousand OCLC records.

Implementation Schedule

March 1, 1979	Delivery and installation of circulation system
March 1, 1979	Orientation and training of Library staff
March 15, 1979	System is operational, conversion procedures begin
August 15, 1979	Library goes online, totally dependent on circulation system.

APPENDIX A

SUMMARY OF COSTS FOR THE ALTERNATIVE SYSTEMS

SUMMARY OF COSTS FOR THE ALTERNATIVE SYSTEMS

Fiscal Year	Annual Costs, Present System	Annual Costs, Present System Online	Annual Costs Commercial System	Annual Cost, Commercial System w/ 5 yr. Payout	Annual Costs, Commercial System w/ 8 yr. Payout
1978-79	$ 105,776	$ 105,523	$ 84,861	$ 132,165	$ 119,261
1979-80	110,304	110,058	87,695	134,999	122,095
1980-81	115,038	114,797	90,652	137,956	125,052
1981-82	119,983	119,750	94,235	141,539	128,635
1982-83	125,151	125,927	97,967	145,271	132,367
1983-84	130,549	130,335	101,857	101,857	136,257
1984-85	136,195	135,991	105,909	105,909	140,309
1985-86	142,095	141,902	110,134	110,134	144,534
1986-87	148,259	148,078	114,543	114,543	114,543
1987-88	154,705	154,538	119,124	119,124	119,124
Total, Annual Costs	$1,288,055	$1,286,899	$1,006,977	$1,243,497	$1,282,177
Estimated One-Time Costs	-0-	$ 53,610	$ 193,300	$ 5,100	$ 5,100
Grand Totals	$1,288,055	$1,340,509	$1,200,277	$1,248,597	$1,287,277

APPENDIX B

ONE-TIME COSTS FOR MODIFICATION TO PRESENT SYSTEM TO PLACE ONLINE

Chart 1

ESTIMATED ONE-TIME COSTS FOR
MODIFICATION TO PRESENT SYSTEM TO PLACE ONLINE

COST ELEMENT	AMOUNT
Six Bell Telephone Instruments, @ $25.00 each	$ 150.00
Installation of one dedicated telephone line	
Bell Telephone charge	30.00
Local Charges	30.00
Six Telex terminals, IBM 3270 Type, @ $2,000 ea, with one controller	12,000.00
1200 System Man Hours @ $20.00 per hour	24,000.00
1160 Programming Man Hours @ $15.00 per hour	17,400.00
TOTAL	$53,610.00

Chart 2

ESTIMATED ONE-TIME COSTS FOR
COMMERCIAL CIRCULATION SYSTEM

COST ELEMENT	AMOUNT
Central Processing Unit Operator's	$187,000
Operator's Console	*
Software Package	*
Magnetic Disk Storage	*
Magnetic Tape Drive	*
Medium Speed Printer	*
Optical Character Recognition (Light Pen) Scanner Terminal	*
Visual Display (CRT) Terminal with Light Pen Scanners	*
Offline Self-contained Subsystem for Checkout & checkin	*
Programming/Installation/Testing	*
Transportation	1,000
Conversion of Approximately 40,000 OCLC records	4,000
Site Preparation	100
Conversion of Patron Records	500
20,000 OCR labels	600
20,000 Date Due slips	100
TOTAL	$193,300

*Included in one package price of $187,000

APPENDIX C

ANNUAL OPERATING COSTS FOR THE ALTERNATIVE SYSTEMS

Chart 1

ANNUAL OPERATING COSTS FOR PRESENT CIRCULATION SYSTEM
1978/79-1987-88

Cost Elements[1]	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Salaries	$ 36,224	$ 38,035	$ 39,937	$ 41,934	$ 44,030	$ 46,232	$ 48,543	$ 50,970	$ 53,518	$ 56,195
Wages	30,525	31,440	32,384	33,355	34,356	35,386	36,448	37,541	38,667	39,827
Computer Services[2]	28,800	30,240	31,752	33,340	35,006	36,756	38,594	40,524	42,550	44,677
Equipment Leases	1,102	1,146	1,192	1,240	1,290	1,340	1,394	1,450	1,508	1,568
Equipment Maintenance	2,175	2,240	2,307	2,376	2,448	2,521	2,597	2,675	2,755	2,638
Postage	2,450	2,548	2,649	2,755	2,866	2.980	3,100	3,224	3,103	3,196
Supplies	4,500	4,680	4,867	5,061	5,264	5,474	5,694	5,922	6,158	6,404
Total	$105,776	$110,304	$115,038	$119,983	$125,151	$130,549	$136,195	$142,095	$148,259	$154,705

[1] Annual inflation rates: Salaries, 5%; Wages, 3%; Equipment Leases, 4%; Equipment Maintenance, 3%; Supplies, 4%; Postage, 4%

[2] Includes program maintenance

Chart 2

ANNUAL OPERATING COSTS FOR PRESENT CIRCULATION SYSTEM PLACED ONLINE
1978/79-1987/88

Cost Elements[1]	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Salaries	$ 36,224	$ 38,035	$ 39,937	$ 41,934	$ 44,030	$ 46,232	$ 48,543	$ 50,970	$ 53,518	$ 56,195
Wages	30,525	31,440	32,384	33,355	34,356	35,386	36,448	37,541	38,667	39,827
Computer Services	28,800	30,240	31,752	33,340	36,006	36,756	38,594	40,524	42,550	44,677
Equipment Leases[2]	24	25	26	27	29	29	30	31	32	33
Equipment Maintenance[3]	3,000	3,090	3,182	3,278	3,376	3,478	3,582	3,690	3,800	3,915
Program Maintenance[4]	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Postage	2,450	2,548	2,649	2,755	2,866	2,980	3,100	3,224	3,353	3,487
Supplies	4,500	4,680	4,867	5,061	5,264	5,474	5,694	5,922	6,158	6,404
Total	$105,523	$110,058	$114,797	$119,750	$125,927	$130,335	$135,991	$141,902	$148,078	$154,538

[1]Annual inflation rates: Salaries, 5%; Wages, 3%; Equipment Leases, 4%; Equipment Maintenance, 3%; Supplies, 4%; Postage, 4%

[2]Annual cost for a dedicated telephone line for communication link to Administrative Computer Center

[3]Maintenance for six IBM 3270 type terminals at $500 each for first year

[4]Included in Computer Services

Chart 3

ANNUAL OPERATING COSTS FOR A COMMERCIAL CIRCULATION SYSTEM
1978/79-1987/88

Cost Elements[1]	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Salaries	$ 36,224	$ 38,035	$ 39,937	$ 41,934	$ 44,030	$ 46,232	$ 48,543	$ 50,970	$ 53,518	$ 56,195
Wages[2]	26,175	26,960	27,769	28,602	29,460	30,344	31,254	32,192	33,157	34,152
Equipment Leases	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Equipment Maintenance[3]	16,512	16,512	16,512	17,007	17,517	18,043	18,584	19,142	19,716	20,308
Program Maintenance[4]	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Supplies[5]	3,500	3,640	3,785	3,937	4,094	4,258	4,428	4,606	4,790	4,982
Postage	2,450	2,548	2,649	2,755	2,866	2,980	3,100	3,224	3,353	3,487
Totals	$ 84,861	$ 87,695	$ 90,652	$ 94,235	$ 97,967	$101,857	$105,909	$110,134	$114,543	$119,124

[1]Annual inflation rates: Salaries, 5%; Wages, 3%; Equipment maintenance, 3%; Supplies, 4%; Postage, 4%

[2]16% less student help than with present circulation system

[3]Three year level cost maintenance contract, with inflation factor of 3% thereafter

[4]Included in Equipment Maintenance cost

[5]OCR labels, date due slips and other office supplies

Chart 4

ANNUAL OPERATING COSTS FOR A COMMERCIAL CIRCULATION SYSTEM
WITH PURCHASE BY TIME PAYMENT OVER FIVE YEARS
1978/79-1987/88

Cost Elements[1]	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Salaries	$ 36,224	$ 38,035	$ 39,937	$ 41,934	$ 44,030	$ 46,232	$ 48,543	$ 50,970	$ 53,518	$ 56,195
Wages[2]	26,175	26,960	27,769	28,602	29,460	30,344	31,254	32,192	33,157	34,152
Annual Payment[3]	47,304	47,304	47,304	47,304	47,304	-0-	-0-	-0-	-0-	-0-
Equipment Leases	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Equipment Maintenance[4]	16,512	16,512	16,512	17,007	17,517	18,043	18,584	19,142	19,716	20,308
Program Maintenance[5]	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Supplies[6]	3,500	3,640	3,785	3,937	4,094	4,258	4,428	4,606	4,790	4,982
Postage	2,450	2,548	2,649	2,755	2,866	2,980	3,100	3,224	3,353	3,487
Total	$132,165	$134,999	$137,956	$141,539	$145,271	$101,857	$105,909	$110,134	$114,543	$119,124

[1]Annual inflation rates: Salaries, 5%; Wages, 3%; Equipment Maintenance, 3%; Supplies, 4%; Postage, 4%

[2]Sixteen percent less student help than with present circulation system

[3]Level cost annual payment for eight years.

[4]Three year level cost maintenance contract, with inflation factor of three percent thereafter

[5]Included in Equipment Maintenance cost

[6]OCR labels, date due slips and other office supplies

Chart 5

ANNUAL OPERATING COSTS FOR A COMMERCIAL CIRCULATION SYSTEM
WITH PURCHASE BY TIME PAYMENT OVER EIGHT YEARS
1978/79-1987-88

Cost Elements[1]	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Salaries	$ 36,224	$ 38,035	$ 39,973	$ 41,934	$ 44,030	$ 46,232	$ 48,543	$ 50,970	$ 53,518	$ 56,195
Wages[2]	26,175	26,960	27,769	28,602	29,460	30,344	31,254	32,192	33,157	34,152
Annual Payment[3]	34,400	34,400	34,400	34,400	34,400	34,400	34,400	34,400	-0-	-0-
Equipment Leases	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Equipment Maintenance[4]	16,512	16,512	16,512	17,007	17,517	18,043	18,584	19,142	19,716	20,308
Program Maintenance[5]	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Supplies[6]	3,500	3,640	3,785	3,937	4,094	4,258	4,428	4,606	4,790	4,982
Postage	2,450	2,548	2,649	2,755	2,866	2,980	3,100	3,224	3,353	3,487
Totals	$119,261	$122,095	$125,052	$128,635	$132,367	$136,257	$140,309	$144,534	$114,543	$119,124

[1]Annual inflation rates: Salaries, 5%, Wages, 3%; Equipment Maintenance, 3%; Supplies, 4%; Postage, 4%

[2]Sixteen percent less student help than with present circulation system

[3]Level cost annual payment for eight years

[4]Three year level cost maintenance contract, with inflation factor of three percent thereafter

[5]Included in Equipment Maintenance cost

[6]OCR labels, date due slips and other office supplies